

RECEIVED

CENTRAL FAX CENTER

NOV. 20. 2006 4:44PM

CBL&H 202 293 6229

NO. 6749 P. 3

NOV 20 2006

PTO/SB/17 (07-06)

Approved for use through 01/31/2007, OMB 0651-0032
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1996, no person is required to respond to a collection of information unless it displays a valid OMB control number.

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2006 (H.R. 4818).

FEE TRANSMITTAL

For FY 2006

Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$1 500.00)

<i>Complete if Known</i>	
Application Number	09/611,955-Conf. #6678
Filing Date	July 6, 2000
First Named Inventor	Cyprian E. Uzoh
Examiner Name	H. K. Vu
Art Unit	2811
Attorney Docket No.	20136-00318-US

METHOD OF PAYMENT (check all that apply)

Check Credit Card Money Order None Other (please identify): IBM Corporation (Fishkill)

Deposit Account Deposit Account Number: 09-0458 Deposit Account Name:

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

Charge fee(s) indicated below Charge fee(s) indicated below, except for the filing fee

Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 Credit any overpayments

FEES CALCULATION**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES	
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)
Utility	300	150	500	250	200	100
Design	200	100	100	50	130	65
Plant	200	100	300	150	160	80
Reissue	300	150	500	250	600	300
Provisional	200	100	0	0	0	0

2. EXCESS CLAIM FEES**Fee Description**

Each claim over 20 (including Reissues)

Each independent claim over 3 (including Reissues)

Multiple dependent claims

Total Claims	Extra Claims	Fee (\$)	Fee Paid (\$)	Multiple Dependent Claims
7	- 40 =	x	=	Fee (\$)

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee (\$)	Fee Paid (\$)	Fee (\$)	Fee Paid (\$)
1	- 6 =	x	=		

HP = highest number of independent claims paid for, if greater than 3.

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
- 100 =	/50	(round up to a whole number) x	=	Fees Paid (\$)

4. OTHER FEE(S)

Non-English Specification, \$130 fee (no small entity discount) 500.00

Other (e.g., late filing surcharge) 1402 Filing a brief in support of an appeal

SUBMITTED BY	<i>Burton A. Amernick</i>	Registration No. (Attorney/Agent)	24,852	Telephone	(202) 331-7111
Signature				Date	November 20, 2006
Name (Print/Type)	Burton A. Amernick				

NOV. 20. 2006 4:43PM

CBL&H 202 293 6229

RECEIVED
CENTRAL FAX CENTER

NO. 6749 P. 1

NOV 20 2006

FAX TRANSMISSION

DATE: November 20, 2006

PTO IDENTIFIER: Application Number 09/611,955-Conf. #6678
Patent Number

Inventor: Cyprian E. Uzoh et al.

MESSAGE TO: US Patent and Trademark Office

FAX NUMBER: (571) 273-8300

FROM: CONNOLLY BOVE LODGE & HUTZ LLP

Burton A. Amernick

PHONE: (202) 331-7111

Attorney Dkt #: 20136-00318-US

PAGES (Including Cover Sheet): 15

CONTENTS: Fee Transmittal (1 page)
Appeal Brief (12 pages)
Charge \$500.00 to deposit account 09-0458
Certificate of Transmission (1 page)

If your receipt of this transmission is in error, please notify this firm immediately by collect call to sender at (202) 331-7111 and send the original transmission to us by return mail at the address below.

This transmission is intended for the sole use of the individual and entity to whom it is addressed, and may contain information that is privileged, confidential and exempt from disclosure under applicable law. You are hereby notified that any dissemination, distribution or duplication of this transmission by someone other than the intended addressee or its designated agent is strictly prohibited.

CONNOLLY BOVE LODGE & HUTZ LLP
1990 M Street, N.W., Suite 800, Washington, DC 20036
Telephone: (202) 331-7111 Facsimile:

NOV. 20. 2006 4:44PM

CBL&H 202 293 6229

RECEIVED
CENTRAL FAX CENTER 6749 P. 2

NOV 20 2006

PTO/SB/97 (08-04)

Approved for use through 07/31/2008. OMB 0651-0031

U. S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Application No. (if known): 09/611,955 Attorney Docket No.: 20136-00318-US

Certificate of Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office.

on November 20, 2006
Date



Signature

Nicole Brown

Typed or printed name of person signing Certificate

(202) 331-7111

Telephone Number

Registration Number, if applicable

Note: Each paper must have its own certificate of transmission, or this certificate must identify each submitted paper.

Fee Transmittal (1 page)
Appeal Brief (12 pages)
Charge \$500.00 to deposit account 09-0458

RECEIVED
CENTRAL FAX CENTER
NOV 20 2006

Docket No.: 20136-00318-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Cyprian E. Uzoh et al.

Application No.: 09/611,955

Confirmation No.: 6678

Filed: July 6, 2000

Art Unit: 2811

For: METHOD TO SELECTIVELY FILL
RECESSES WITH CONDUCTIVE METAL

Examiner: H. K. Vu

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

11/21/2006 HDEMESS1 00000088 090458 09611955
01 FC:1402 500.00 DA

Dear Sir:

As required under § 41.37(a), this brief is filed more than two months after the Notice of Appeal filed in this case on September 18, 2006, and is in furtherance of said Notice of Appeal.

The fees required under § 41.20(b)(2) are dealt with in the accompanying
TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37
and M.P.E.P. § 1206:

- I. Real Party In Interest
- II. Related Appeals and Interferences
- III. Status of Claims
- IV. Status of Amendments
- V. Summary of Claimed Subject Matter
- VI. Grounds of Rejection to be Reviewed on Appeal
- VII. Argument
- VIII. Claims
- Appendix A Claims

500773

Application No.: 09/611,955

Docket No.: 20136-00318-US

Appendix B Evidence
Appendix C Related Proceedings

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is: International Business Machines Corporation.

II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 32 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 1-24
2. Claims withdrawn from consideration but not canceled: 0
3. Claims pending: 25-32
4. Claims allowed: 0
5. Claims rejected: 25-32

C. Claims On Appeal

The claims on appeal are claims 25-32

IV. STATUS OF AMENDMENTS

Applicant did not file an Amendment After Final Rejection.

NOV. 20. 2006 4:45PM CBL&H 202 293 6229

NOV 20 2006 NO. 6749 P. 6

Application No.: 09/611,955

Docket No.: 20136-00318-US

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a semiconductor structure. The semiconductor structure of the present invention as recited in independent claim 25 comprises a semiconductor substrate (see page 6, line 13 and page 22, original claim 25 lines 1 and 2), a recess 2 located in at least one major surface of the semiconductor substrate (see page 1, lines 14-16; Figure 1; page 22, original claim 25, lines 2 and 3; and original abstract of disclosure);

an electrical insulating layer 3 located over the at least one major surface and in said recess (page 7, lines 20-23 and Figure 1);

a conductive barrier 4 located over the insulating layer in the recess and over the at least one major surface (page 8, lines 1 and 2 and Figure 1);

a plating seed layer 6 over the conductive barrier within the recess only (page 6, lines 17-19; page 8, lines 18-19; Figure 1; original claim 25, lines 5-7); and a conductive metal 8 in the recess only (page 6, lines 19-20; page 10, lines 4-5; Figure 3; page 23, original claim 25, lines 7-8).

According to claim 26, the barrier 4 comprises a layer of tantalum nitride adjacent said insulating layer and a layer of tantalum above said tantalum nitride layer (page 8, lines 1-8).

According to claim 27, the tantalum nitride layer is about 15 to about 500 Å thick and said tantalum layer is about 500 to about 5000 Å thick (page 8, lines 1-11).

According to claim 28, the seed layer 6 is copper (page 8, lines 20-21).

According to claim 29, the copper seed layer 6 is sputtered copper (page 8, lines 20-21).

According to claim 30, the copper seed layer 6 is about 100 to about 2000 Å thick (page 8, lines 26-27).

According to claim 31, the conductive metal 8 is copper (page 10, line 4).

NOV. 20. 2006 4:45PM

CBL&H 202 293 6229

NO. 6749 P. 7

**RECEIVED
CENTRAL FAX CENTER**

Application No.: 09/611,955

NOV 20 2006

Docket No.: 20136-00318-US

According to claim 32, the conductive metal 8 is about 4000 Å to about 30,000 Å thick
(page 12, lines 7-8).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- A. Do Claims 25-32 satisfy the definiteness requirements of 35 U.S.C. § 112, second paragraph in the recitations "a conductive barrier located over said insulation layer in said recess and over said at least one major surface" and "a conductive metal in said recesses only"?
- B. Has the Examiner established that Claims 25 and 28-32 are obvious and therefore unpatentable under 35 USC 103 over the cited art and namely over US Patent 5,821,168 to Jain in view of US Patent 4,577,395 to Shibata?
- C. Has the Examiner established that Claims 26 and 26 are obvious and therefore unpatentable under 35 USC 103 over the cited art and namely over US Patent 5,821,168 to Jain in view of US Patent 4,577,395 to Shibata and further in view of US Patent 6,329,284 to Maekawa?

VII. ARGUMENT

- A. Claims 25-32 satisfy the requirements of 35 USC 112, second paragraph. Claims 25-32 were rejected under 35 U.S.C. § 112, second paragraph as being indefinite in the use of the recitations "a conductive barrier located over said insulation layer in said recess and over said at least one major surface" and "a conductive metal in said recesses only". This rejection is not deemed tenable.

The specification expressly discloses providing a conductive barrier located over the insulation layer. For example, page 8, lines 1 and 2 state:

Application No.: 09/611,955

Docket No.: 20136-00318-US

"Next, a conductive barrier 4 is provided over the insulating layer." Also see Figure 3.

The specification also expressly discloses "a conductive metal in said recesses only."

Along these lines, see page 6, lines 19-22, which states:

"An electroplated conductive metal is located in the recesses only... and not on other portions of the substrate."

Also see page 10, lines 9 and 10, which states:

"The conductive metal does not plate on the barrier layer but instead preferably plates on the seed layer." The seed layer remains in the recesses only (see page 6, lines 18-19).

Accordingly, at this stage, the conductive metal only plates in the recesses, not on the major surface of the substrate, even though small amounts of excess of conductive metal might exist above the recesses. Therefore, as stated at page 12, lines 11-27 of the original disclosure, the conductive material 8 can then be chemically-mechanically polished to remove small amounts of metal above the surface of the recesses. Typical polishing slurries contain colloidal silica. At this point and prior to removal of the barrier layer 5, all of the claimed recitations are disclosed. Claiming a structure at this stage is entirely proper.

It is only, after removal of the small amounts of metal above the surface of the recesses, is the barrier layer 5 removed. For example, see page 12, lines 16 and 17 that state:

"Next, the barrier layer 5 and plated metal is removed down to the insulating layer 3 (see Fig. 4)." (emphasis mine)

Application No.: 09/611,955

Docket No.: 20136-00318-US

For a similar disclosure, also see figure 7.

B. Claims 25 and 28-32 are not rendered unpatentable by US Patent 5,821,168 to Jain in view of US Patent 4,577,395 to Shibata.

Claims 25 and 28-32 were rejected under 35 USC 103 as being unpatentable over US Patent 5,821,168 to Jain in view of US Patent 4,577,395 to Shibata. The cited references fail to render obvious claims 25 and 28-32.

As appreciated by the examiner, the recesses 72 in insulating layer 52 of Jain do not exist in a semiconductor substrate as recited in the claims. The recesses exist only on the substrate. In fact, the recesses (i.e. interconnect channels) in Jain referred to in the office action cannot exist in the semiconductor substrate since they must be present above the interconnects 28. Therefore, in view of the process and structure required by Jain, the recesses cannot exist in the semiconductor substrate. To include the recesses in the semiconductor substrate would be contrary to the objectives of Jain and defeat the purposes of the reference.

US Patent 4,577,395 to Shibata fails to overcome the above discussed deficiencies of Jain with respect to rendering unpatentable the above claims since, among other things, Shibata is not even properly combinable with Jain. As stated above, including the recesses in the semiconductor substrate would be contrary to the objectives of Jain and defeat the purposes of Jain. Where the proposed modification would be contrary to the objectives of the cited reference, the rejection is not proper. For example, see *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984). Moreover, Shibata does not include a barrier layer or metal in the recesses.

C. Claims 26 and 27 are not rendered unpatentable by US Patent 5,821,168 to Jain in view of US Patent 4,577,395 to Shibata and further in view of US Patent 6,329,284 to Maekawa.

Application No.: 09/611,955

Docket No.: 20136-00318-US

Claims 26 and 27 were rejected under 35 USC 103 as being unpatentable over US Patent 5,821,168 in view of US Patent 4,577,395 to Shibata and further in view of US Patent 6,329,284 to Maekawa. The cited references fail to render obvious claims 26 and 27. US Patent 6,329,284 to Maekawa fails to overcome the above discussed deficiencies of Jain and Shibata with respect to rendering unpatentable the present claims. In addition, the presence of a layer of tantalum nitride and a layer of tantalum as recited in claims 27 and 28 would not be present in Jain because of the process required by Jain which involves nitriding of the oxide dielectric. See column 2, lines 35-38. To include layers of tantalum nitride and a layer of tantalum as mentioned by Maekawa would be contrary to the stated objections of Jain and therefore not an obvious modification. As mentioned above, where the proposed modification would be contrary to the objectives of the cited reference, the rejection is not proper. For example, see *In re Gordon, supra*.

Discussion of Case Law of Interest

The mere fact that cited art may be modified in the manner suggested in the Office Action does not make this modification obvious, unless the cited art suggest the desirability of the modification. No such suggestion appears in the cited art in this matter. The Board's attention is kindly directed to *In re Lee* 61 USPQ2d 1430 (Fed. Cir. 2002) *In re Dembicza et al.* 50 USPQ2d. 1614 (Fed. Cir. 1999), *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984), *In re Laskowski*, 10 USPQ2d. 1397 (Fed. Cir. 1989) and *In re Fritch*, 23, USPQ2d. 1780 (Fed. Cir. 1992).

In *Dembicza et al.*, *supra*, the Court at 1617 stated: "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. See, e.g., C.R. Bard, Inc., v. M3 Sys., Inc., 157 F.3d. 1340, 1352, 48 USPQ2d. 1225, 1232 (Fed. Cir. 1998) (describing 'teaching or suggestion motivation [to combine]' as in 'essential evidentiary component of an obviousness holding'), In re Rouffet, 149 F.3d 1350, 1359, 47 USPQ2d. 1453, 1459 (Fed. Cir. 1998) ('the Board must identify specifically...the reasons one of ordinary skill in the art would have been motivated to select the references and combine them');..."

Application No.: 09/611,955

Docket No.: 20136-00318-US

The present invention could only be derived from the cited art by the use of "hindsight", i.e. by knowing what Applicants' invention was in advance from Applicants' disclosure, and then *ex post facto* reconstructing Applicants' invention from the prior art after a thorough search. It is impermissible under 35 U.S.C. 103 to use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. See *In re Fine*, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). Furthermore, it is well settled that hindsight reconstruction using the patent application as a guide through the maze of prior art references, combining "the right references in the right way" so as to achieve the result of the claimed invention must be avoided. See *Grain Processing Corp. v. American Maize-Products Corp.*, 5 U.S.P.Q.2d 1788 (Fed. Cir. 1988).

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as Appendix A. As indicated above, the claims in Appendix A do include the amendments filed by Applicant on October 19, 2001.

Dated: November 20, 2006

Respectfully submitted,

By 
Burton A. Amernick

Registration No.: 24,852
CONNOLLY BOVE LODGE & HUTZ LLP
1990 M Street, N.W., Suite 800
Washington, DC 20036
(202) 331-7111
(Fax)
Attorney for Applicant

Application No.: 09/611,955

Docket No.: 20136-00318-US

RECEIVED
CENTRAL FAX CENTERAPPENDIX A

NOV 20 2006

Claims Involved in the Appeal of Application Serial No. 09/611,955

25. A semiconductor structure, comprising: a semiconductor substrate; a recess located in at least one major surface of said semiconductor substrate; an electrical insulating layer located over said at least one major surface and in said recess; a conductive barrier located over said insulating layer in said recess and over said at least one major surface; a plating seed layer located over said conductive barrier within said recess only; and a conductive metal in said recess only.

26. The semiconductor structure of claim 25 wherein said barrier comprises a layer of tantalum nitride adjacent said insulating layer and a layer of tantalum above said tantalum nitride layer.

27. The semiconductor structure of claim 26 wherein said tantalum nitride layer is about 15 to about 500 Å thick and said tantalum layer is about 500 to about 5000 Å thick.

28. The semiconductor structure of claim 25 wherein said seed layer is copper.

29. The semiconductor structure of claim 28 wherein said copper is sputtered copper.

30. The semiconductor structure of claim 28 wherein said copper is about 100 to about 2000 Å thick.

Application No.: 09/611,955

Docket No.: 20136-00318-US

31. The semiconductor structure of claim 25 wherein said conductive metal is copper.
32. The semiconductor structure of claim 31 wherein said conductive metal is about 4000 Å to about 30,000 Å thick.

Application No.: 09/611,955

Docket No.: 20136-00318-US

RECEIVED
CENTRAL FAX CENTER

APPENDIX B

NOV 20 2006

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

Application No.: 09/611,955

Docket No.: 20136-00318-US

RECEIVED
CENTRAL FAX CENTER

NOV 20 2006

APPENDIX C

No related proceedings are referenced in II. above, hence copies of decisions in related proceedings are not provided.